OPTIMAL TECHNOLOGY INC.
BLUE WOOD 127
EARLYSVILLE, VA. 22936
After 1PM 804-973-5482

EP-2A PROM PROGRAMMER

PATENT PENDING

WELCOME A BOARD!

The EP-2A is a low cost method for using your microcomputer to program the 2708 and the 2716 E-PROMS. Follow the instructions of this kit and you will be up and running in a couple of hours.

ASSEMBLY

The kit is shipped with the following parts:

[ ] [1] Printed CKT card
[ ] [1] 44 Pin card edge connector
[ ] [1] 24 pin IC socket
[ ] [1] 4040, C-MOS, IC
[ ] [1] 75451, IC
[ ] [1] 723, IC
[ ] [1] 1.5K, ¼W, 5% Resistor
[ ] [4] .1 Mf, 50V Capacitors
[ ] [1] 100 pf, 50v Capacitor
[ ] [3] 1k, ¼W, 5% Resistors
[ ] [2] 33 ohm, ¼W, 5%, Resistors
[ ] [1] 27K, ¼W, 5%, Resistor
[ ] [2] 10K, ¼W, 5%, Resistors

Refer to ASSEMBLY OF PC CARD for detailed instructions

CALIBRATION OF 25 VOLT REGULATOR

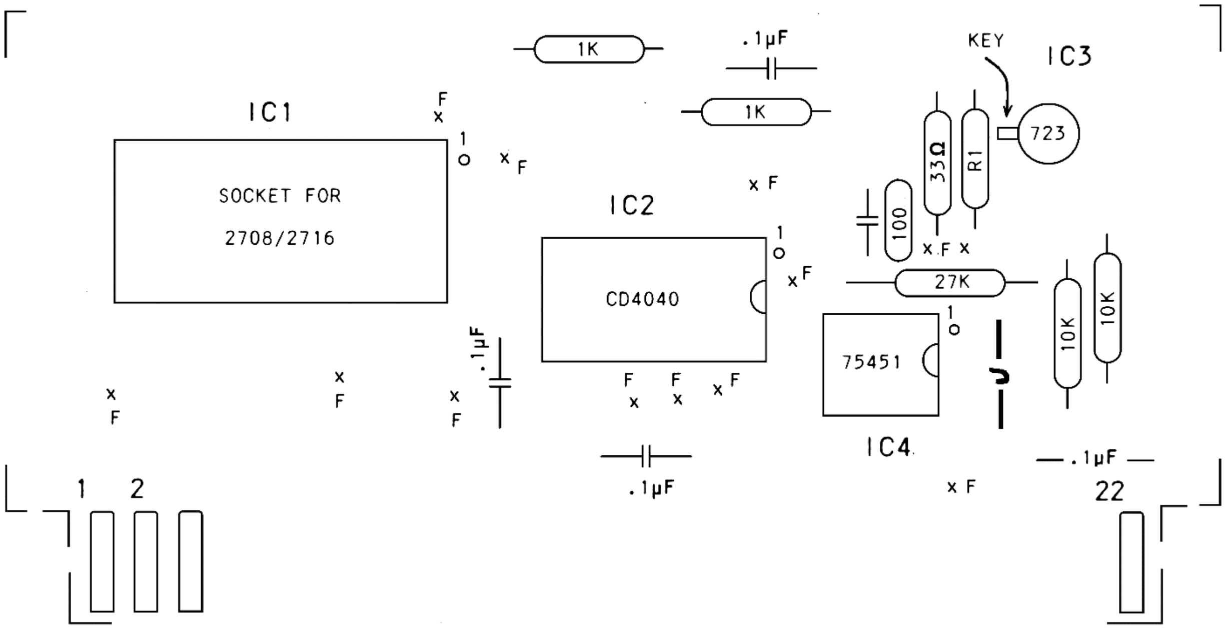
Complete the wiring to the EP-24 circuit board connector as shown for EP-2A Connections for 2708 programming. Leave off the wire from pin 22 to pin L. Turn ON the +28 volt supply only and select a resistor [1.5K, 1K, or jumper] between the point on the PC card marked J such that the voltage from pin 22 to pin D of the circuit connector is 25 ±1 volt. A 1K resistor is the nominal resistor value to obtain this voltage. Reconnect Pin 22 to Pin L.

SOFTWARE FOR 2708/2716 PROGRAMMING

Refer to the software section of this kit. If you write your software, so that it is easy to change the programming pulse width, and number of times each location is programmed, the soft-ware is the same for the 2708 and 2716 proms. The 2716 requires only [1] one programming loop and a pulse width of 50 milliseconds. Circuit Board connections are shown for programming the 2716 prom with the EP-2A.

ASSEMBLY OF PC CARD

EP-2A



NOTES:

(1) WHEN PADS ARE LOCATED TOP AND BOTTOM OF PC CARD, SOLDER BOTH SIDES.

(2) INSTALL RESISTORS, CUT OFF LEADS, SAVE THEM FOR FEEDTHROUGHS (F).

(3) INSTALL (4) .1 Mf capacitors and 100 pf capacitors.

(4) INSTALL IC-2, IC-3, and IC-4, also socket for IC-1.

(5) SOLDER FEEDTHROUGH JOINTS BY PLACING CUT-OFF COMPONENT LEADS THROUGH HOLES. (Solder both sides of card)-i.e. 12 points marked (X F).

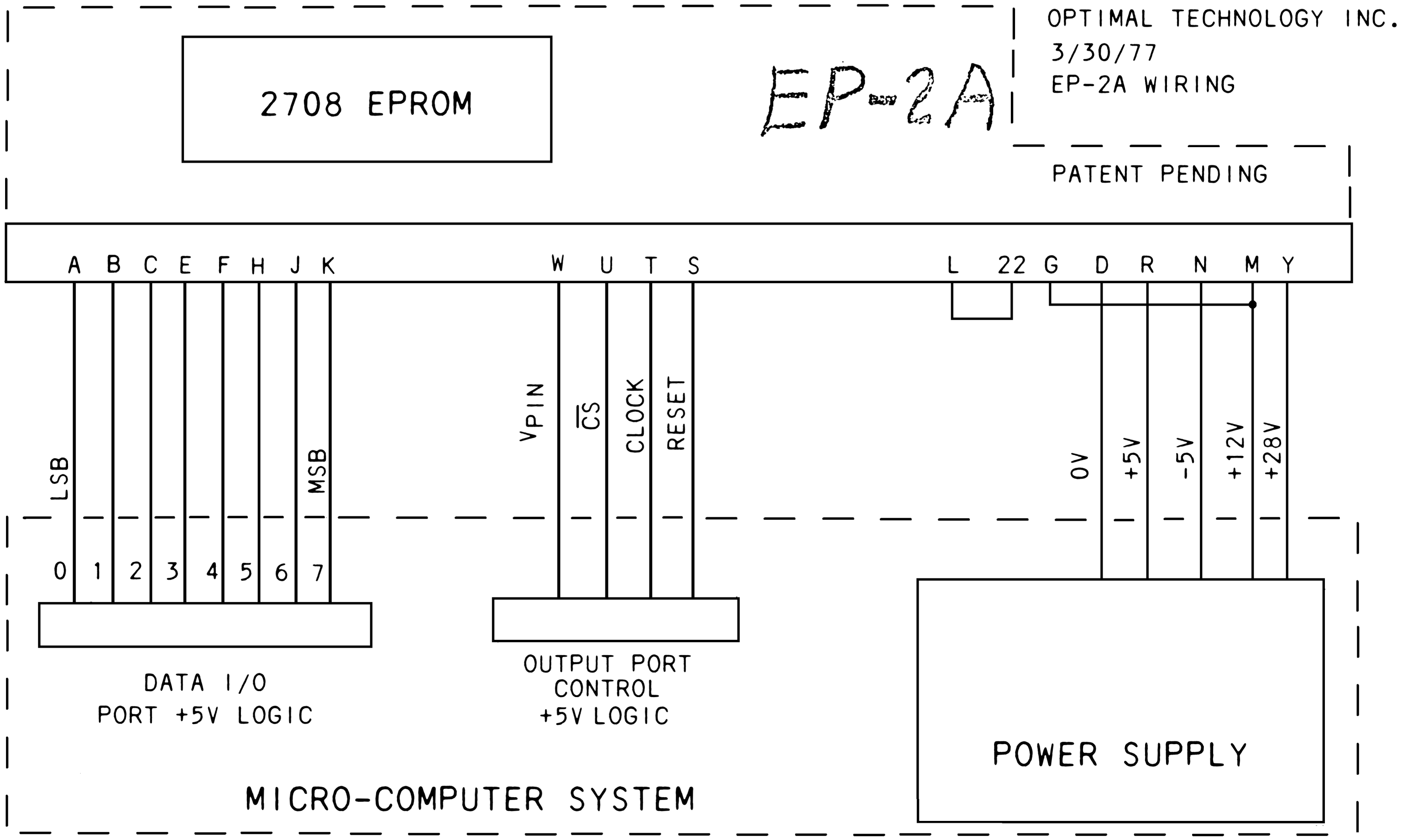
(6) DO NOT INSTALL THE JUMPER (J) YET!

(7) YOU SHOULD HAVE 33 ohm, 1.5K and 1k resistors left over, these will be used in the calibration of the 25 VOLT regulator.

(8) R1 IS USED ONLY WHEN THE EP-2A IS USED FOR THE 2716 FROM.

(9) Some PC cards have eyelets, solder them on both sides of PC board.

(10) R1 is not used for the 2708, however the eyelet or feedthrough must be soldered.



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EP-2A WIRING

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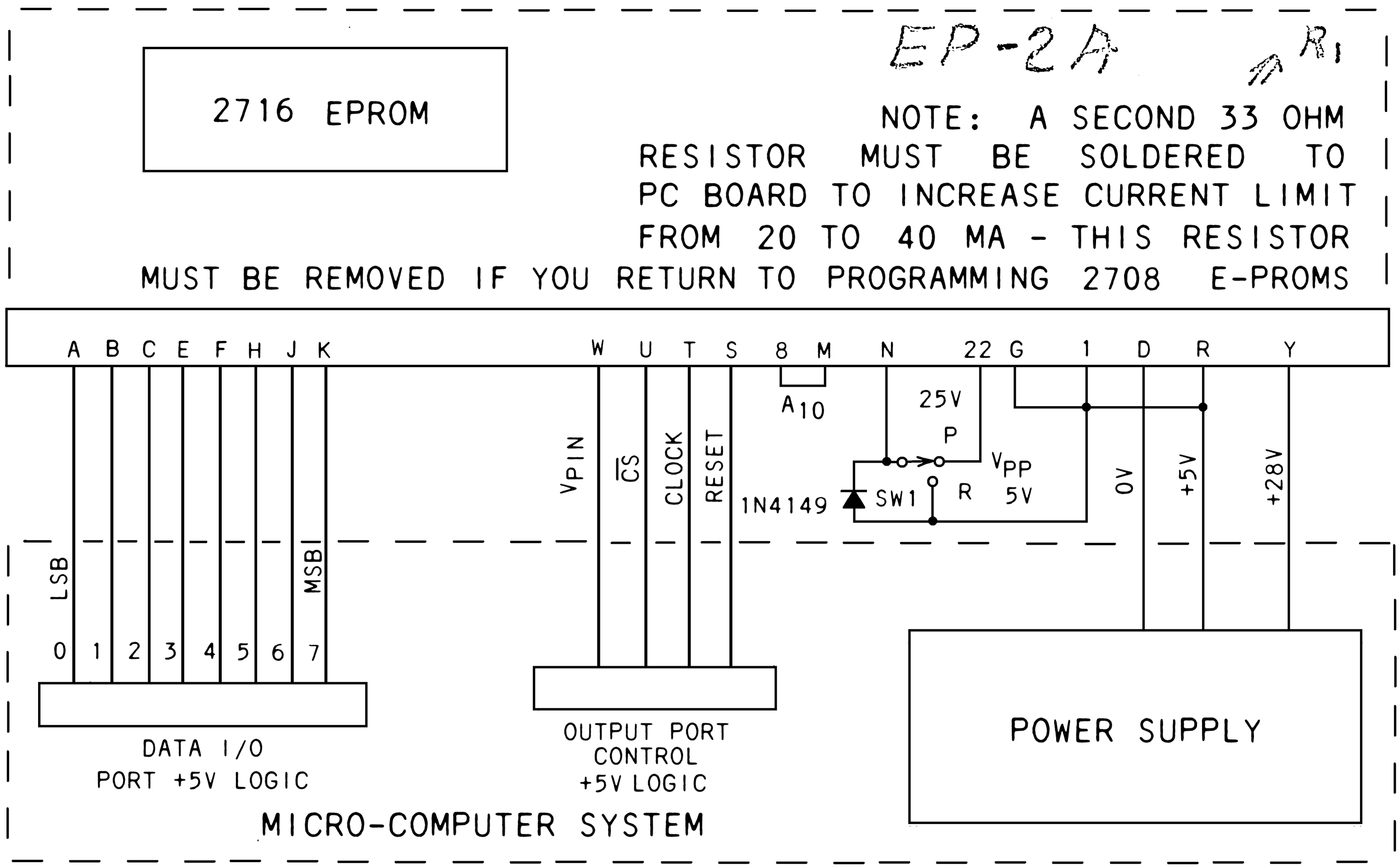
EP-2A CONNECTIONS FOR 2708 PROGRAMMING



NOTE: A SECOND 33 OHM RESISTOR MUST BE SOLDERED TO PC BOARD TO INCREASE CURRENT LIMIT FROM 20 TO 40 MA - THIS RESISTOR MUST BE REMOVED IF YOU RETURN TO PROGRAMMING 2708 E-PROMS

EP-2A CONNECTIONS FOR 2716 PROGRAMMING

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REQUIRED SOFTWARE FOR THE EP-2 PROM PROGRAMMER (FOR THE 2708 E-PROM)

CIRCUIT BOARD INTERFACE

Connections to the EP-2 circuit board are as follows with reference to the enclosed schematic diagram. From your micro-computer connect an 8 bit bi-directional I/O Port to pins A, B, C, E, F, H, J, K. Pin A and K are respectively the least and most significant bit positions. Data to and from the 2708 E-PROM are transferred over these 8 lines. (8 bit parallel, T T L compatible)

Four control lines are required to control the READ/WRITE operation of the EP-2. A reset line, pin S, is used to reset the address counter (Logic "1" resets) and a clock line, pin T, which is used to advance the counter. Both the RESET and CLOCK are C-MOS compatible inputs. On some Micro-computer systems it may be necessary to add 6.8K pull-up resistors on these two lines (TO +5VOLTS) if logic levels of the I/O ports will not drive C-MOS logic. The address counter on the EP-2 card advances when the clock changes from a logic "1" to "0".

Two additional control lines, which are T T L compatible are the CHIP SELECT, pin U, ($\overline{CS}$) and Program Pulse Input, pin W, (VP IN). A logic "1" on the CHIP SELECT LINE selects the prom for WRITE while a logic "0" selects the prom for read operation. A programming pulse of 26 Volts (20 ma.) is applied to the E-Prom when pin W is a logic "1". Required power supply voltages (+ 5% tolerance) are the following:

+5 Volts to pin R, 150 MA., MAX current
-5 Volts to pin N, 150 MA., MAX current
+12 Volts to pin M, 150 MA., MAX current
+28 Volts to pin Y, 50 MA., MAX current

NOTE- It is best to always keep the +28 Volts turned off except just before a WRITE PROM program execution.*

EP-2A SOFTWARE REQUIREMENTS--WRITE/READ

All microprocessors will have about the same functional program, although detail instruction sets may differ. A typical software flow chart is enclosed in this data package.

In general, the 2708 E-PROM is programmed by writing zeros in the appropriate locations. By U V erasure the prom contents are all 1's in all locations. (Hex F F for each location). With reference to the Software flow chart, the program is started by inputting the RAM starting address and the number of bytes to be programmed. It is recommended that a minimum of 512 bytes he programmed each time.

The Flow Chart shows two main programming loops. Your micro-computer should read a location from RAM, output this byte to the Prom, generate a programming pulse (VP = "1" for .75 milliseconds), advance address counter on the EP-2 card by changing the logic level on the clock line from a "0" to "1" to "0" making the clock width about 20 (micro) M sec., GET the next byte from RAM, output to prom, output the programming pulse, advance the address counter, etc., --etc!, until all locations in the prom have been programmed 1 time. Then repeat the entire process 133 times if you are using a programming pulse of .75 milliseconds.

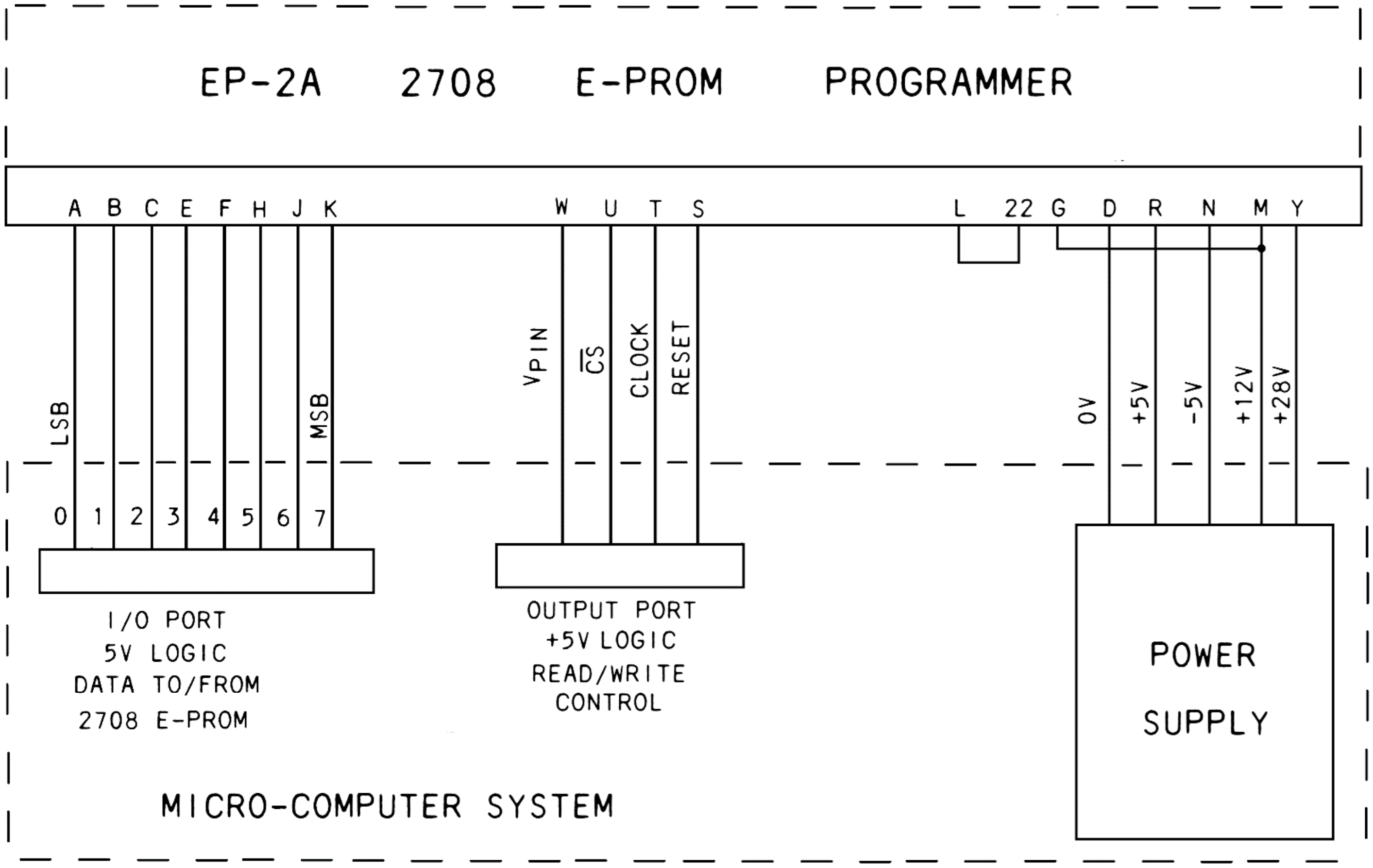
It is a good idea to build in delays of 20 to 30 microseconds when you, output data to the prom, advance the address counter, change the $\overline{CS}$ line, reset the address counter, since this will give the electrical signals time to get to where you want them to go.

*For 2716 E-PROM, power Up and Down with switch SW 1 in the +5V position. Place switch SW 1 in +25V position just before running WRITE program; return to +5V when finished. Consult Intel Data Sheet.

Thus wire length effects are minimized. You should keep wires as short as possible/reasonable.

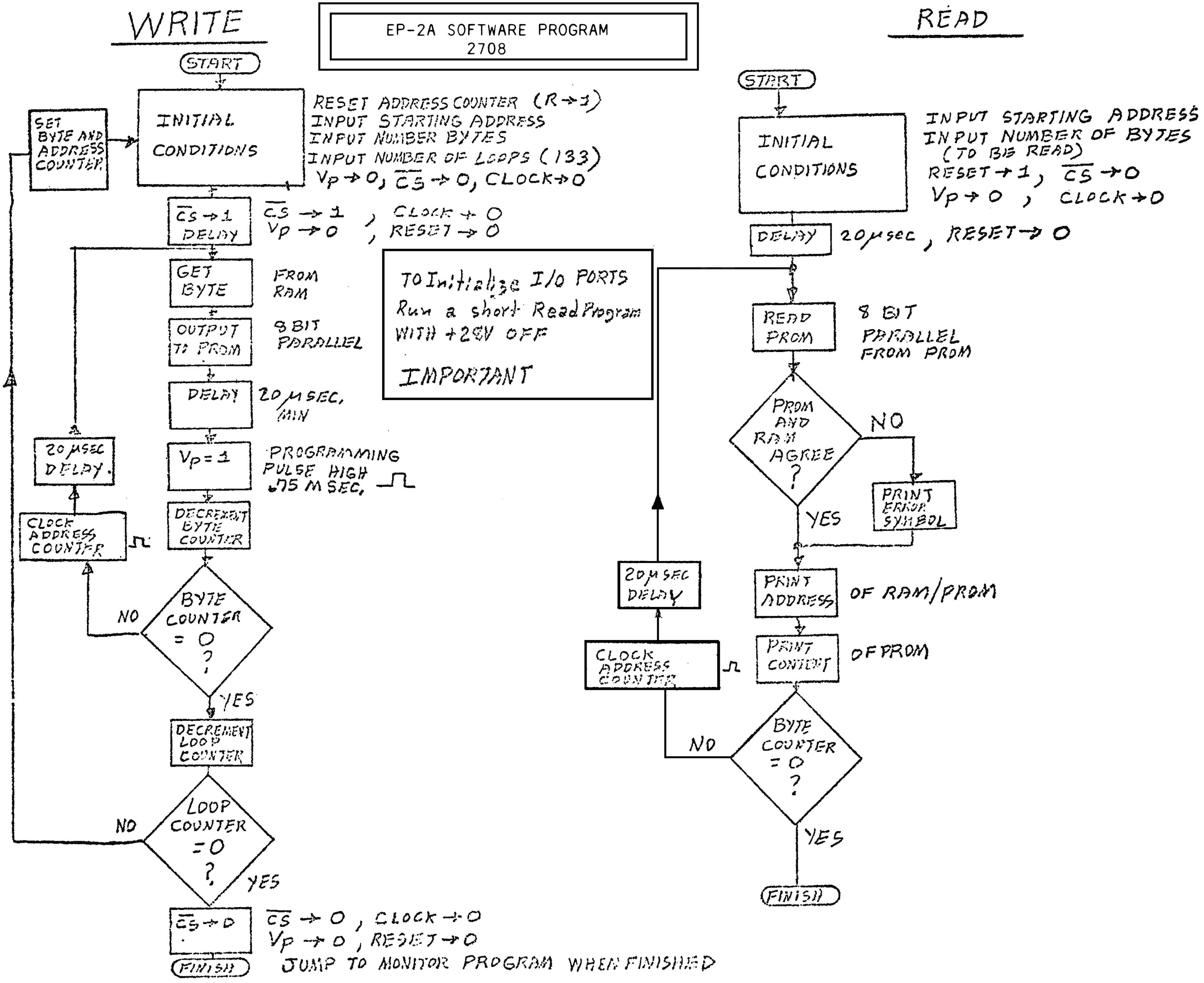
Remember the programming- control line, P, should be kept at a logic "0" at all times except when a .75- millisecond pulse is generated. The CLOCK line should always be kept at a logic "0" except when your program advances the address counter. During the entire WRITE cycle $\overline{CS}$ is held at a logic "1" and is returned to a logic "0" at the end of the write cycle. The RESET Line is always at a logic "0" except when it is desired that the address counter be reset to zero. If you want a starting location that is not zero (Read or Write) it will be necessary to count "up" the address counter during the INITIAL CONDITION portion of the program.

Finally it will be helpful to get a copy of the manufacturer's data sheet for the 2708. We are sure that the EP-2 will give excellent results and certainly at a significantly lower cost than any 2708 E-PROM programmer on the market today.



TYPICAL WIRING DIAGRAM

EP-2A SOFTWARE PROGRAM
2708



TO Initialize I/O PORTS
Run a short Read Program
WITH +26V OFF

IMPORTANT

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EP-2A

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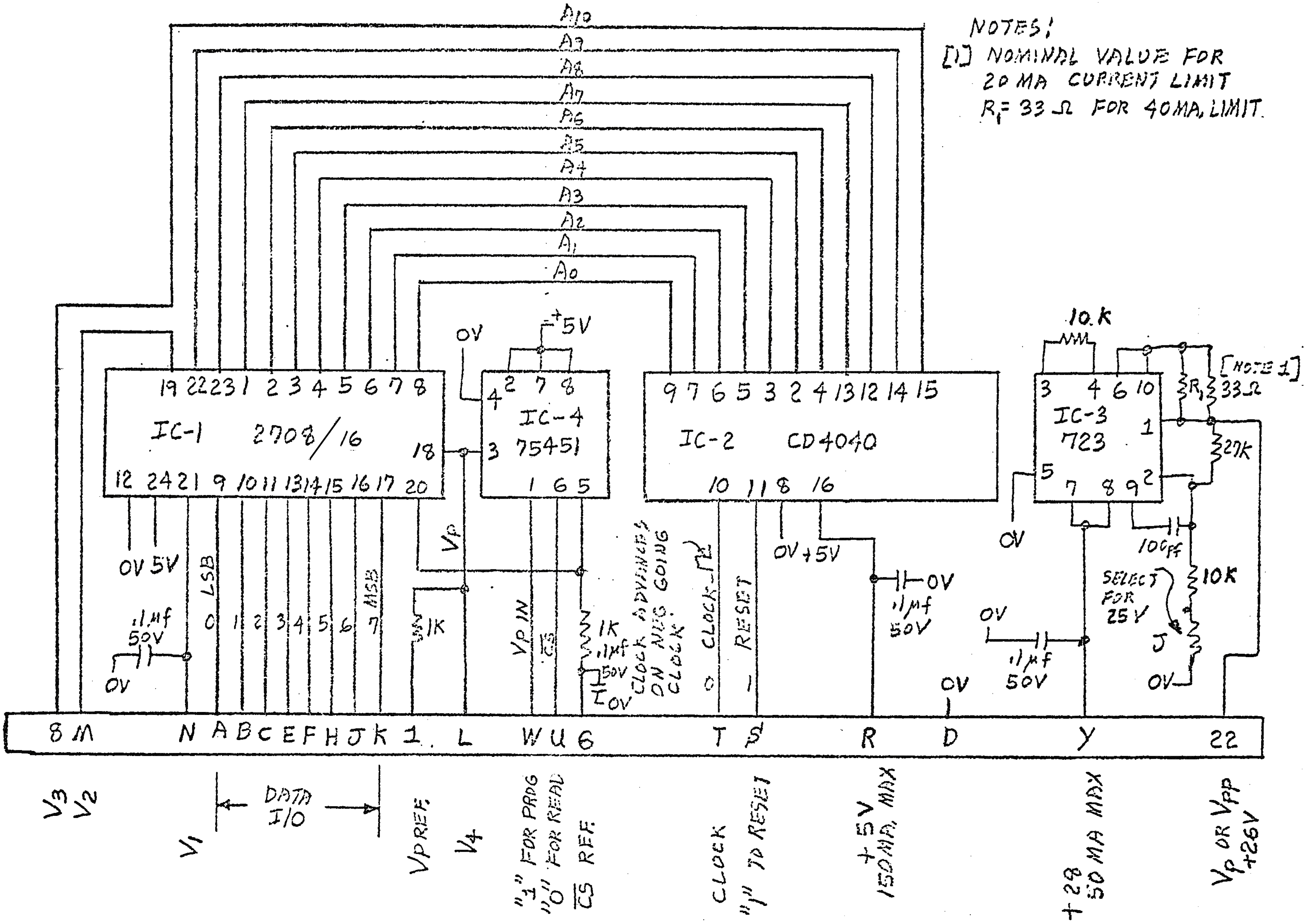

NOTES:
[1] NOMINAL VALUE FOR 20 MA CURRENT LIMIT
R_1 = 33 Ω FOR 40MA, LIMIT